AVERAGING AND SIGNAL PROCESSING

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Topic #5 or #6: *Nonstandard methods in measure theory, stochastic analysis, probability and statistics. Nonstandard methods Dynamical Systems and Control Theory.*

Recently, M. Fliess (école polytechnique, Palaiseau), a specialist in signal processing and automatic control, wrote a note with a very new interesting idea:

When we want to measure a function f_0 of time, the result f is corrupted by noise. Many mathematicians try to modelize this noise. The challenge is to reconstruct the function f_0 with the knowledge of f only, and some hypothesis on the structure of f_0.

The most common methods use statistical treatments, and the noise is viewed as a realisation of a stochastic process.

Another kind of methods works on the Laplace (or Fourier) transform. It allows to decompose the signal into a sum of different parts. Each is characterised by some properties (high-frequence, low-frequence, white noise, ...).

The new method of M. Fliess uses non standard analysis. It is, at present time, a work in progress. It uses the nonstandard theory of averaging due to C. Reder, J. Harthong, Y. Perrin, P. Cartier, ...

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